DOCUMENT RESUME

ED 195 442 SE 033 612

AUTHOR McNeill, Perry R.: And Others
TITLE Evaluation and Dissemination of the Electrical Power Engineering Technology Curriculum Model. Final Report.
INSTITUTION Oklahoma State Univ., Stillwater.
SPONS AGENCY National Science Foundation, Washington, D.C.
PUB DATE 79
GRANT NSF-SED76-82489
NOTE 61p.: Appendix A, pages 26-30, removed due to copyright restrictions.

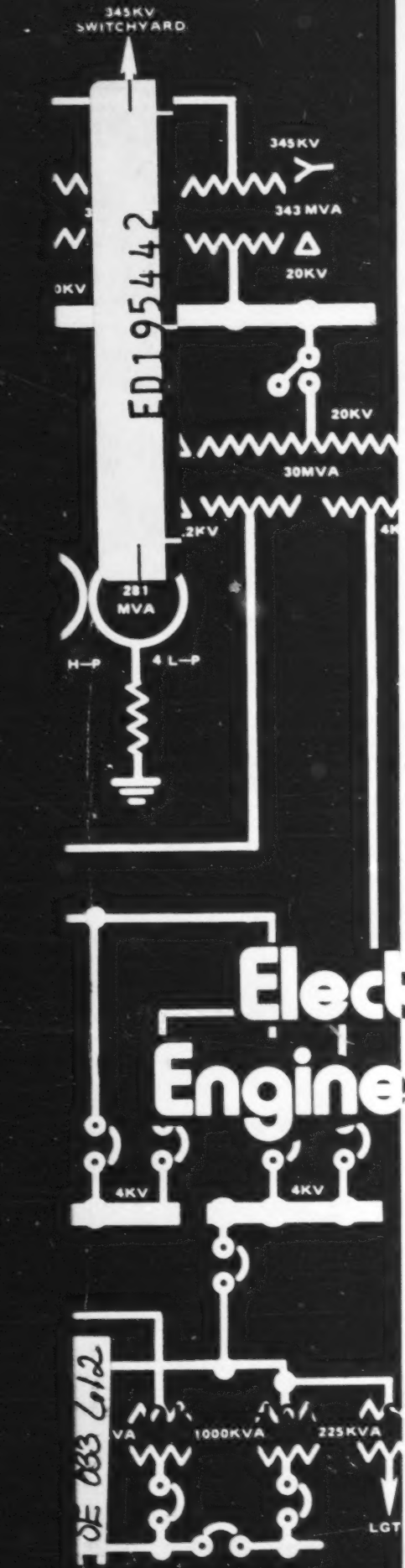
EDRS PRICE MF01/PC03 Plus Postage.
DESCRIPTORS Curriculum Evaluation: Electrical Systems: *Engineering Technology: *Engineers: *Evaluation: *Information Dissemination: Program Evaluation: Science Programs

ABSTRACT

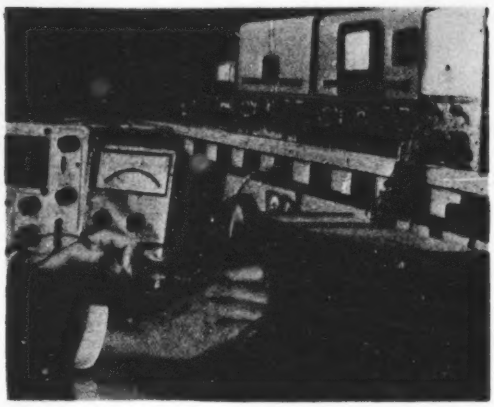
Described is a project initiated to evaluate and disseminate the Electrical Power Engineering Technology Curriculum developed at Oklahoma State University. The objective of the evaluation phase, to have the original model curriculum evaluated by both present and potential employers, was accomplished in a two-day workshop with participation of representatives from power generation and distribution companies, engineering firms, electrical equipment manufacturers, and recent graduates of the program. Participants worked in small groups to identify strengths and weaknesses of the program. Overall evaluation was accomplished through use of a questionnaire. A major thrust of the dissemination phase was a four-day workshop for engineering technology educators invited on the basis of geographical distribution and type of institution. Other modes of dissemination included direct mailing of materials to individuals and institutions and trips to conferences and other institutions by project staff members. Results indicate an awareness and acceptance of the curriculum in both industry and the educational community. (Author/SK)

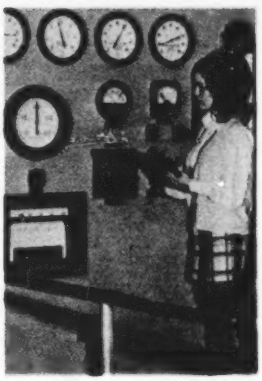
****
* Reproductions supplied by EDRS are the best that can be made *
* from the original document. *
****

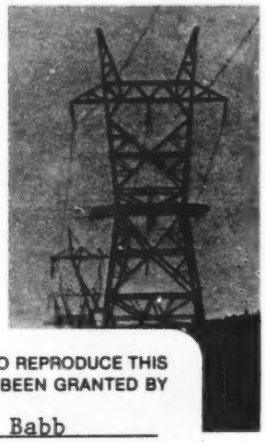
SED 76-82489
SE



ED195442







U.S. DEPARTMENT OF HEALTH, EDUCATION & WELFARE
NATIONAL INSTITUTE OF EDUCATION

THIS DOCUMENT HAS BEEN REPRODUCED EXACTLY AS RECEIVED FROM THE PERSON OR ORGANIZATION ORIGINATING IT. POINTS OF VIEW OR OPINIONS STATED DO NOT NECESSARILY REPRESENT OFFICIAL NATIONAL INSTITUTE OF EDUCATION POSITION OR POLICY

"PERMISSION TO REPRODUCE THIS MATERIAL HAS BEEN GRANTED BY

Patricia Babb
of the NSF

TO THE EDUCATIONAL RESOURCES INFORMATION CENTER (ERIC)."

Electrical Power Engineering Technology

FINAL REPORT
EVALUATION AND DISSEMINATION OF THE ELECTRICAL POWER ENGINEERING TECHNOLOGY CURRICULUM MODEL
SED 76-82489

STATE UNIVERSITY / STILLWATER

OE 033 612

FINAL REPORT

EVALUATION AND DISSEMINATION OF THE ELECTRICAL POWER ENGINEERING TECHNOLOGY CURRICULUM MODEL

Project Director: Dr. Perry R. McNeill, Professor and Chairman, Electrical Engineering Technology

Assistant Project Director: Dr. Russell L. Heiserman, Asst. Professor, Electrical Engineering Technology

Submitted: National Service Foundation

Acknowledgements: The directors gratefully acknowledge NSF for the financial support via NSF Grant SED 76-82489 which made the evaluation and dissemination of the electrical power curriculum possible. We also wish to acknowledge the outstanding efforts of the project personnel.

Duration of Project June 15, 1977 through November 30, 1978

Project Personnel: Mr. Jack D. Burson
Mr. James K. Shelton
Dr. Neal A. Willison
Mrs. Mary R. Snavely

DEC 1 2 1980

PREFACE

Purpose This document was written to serve as the final report to the National Science Foundation on grant, SED 76-82489, Evaluation and Dissemination of the Electrical Power Engineering Technology Curriculum Model,

Scope This project was started in June 1977 and was completed in November 1978. There were two major objectives of this project which revolved around the Electrical Power Engineering Technology curriculum developed at Oklahoma State University under a previous NSF grant. The first objective was to have the results of the original curriculum development project evaluated by a group of electrical power industrialists and secondly, to disseminate the results of the evaluation and the model curriculum materials to a select group of educators from a wide geographic area across the United States.

Summary The evaluation of the electrical power curriculum by a select group of engineers and managers from the electrical power industry was very effective. The group was most pleased with the curriculum and the graduates from this program. The dissemination phase of the contract was accomplished in several modes. The major thrust was a four-day on-campus workshop for engineering technology educators. Direct mailout of materials has been made to many individuals and institutions. The project staff also made several trips to conferences and other institutions to describe the electrical power curriculum. The general consensus is that both industry and the educational community are now aware of the New Model Electrical Power Curriculum.

TABLE OF CONTENTS

Introduction..... 1

Evaluation Conference..... 8

Dissemination Conference..... 21

Summary..... 24

Appendix A 25

Appendix B..... 31

Appendix C..... 37

Appendix D..... 41

Appendix E..... 43

Appendix F..... 52

Appendix G..... 55

INTRODUCTION

Need for Dissemination and Evaluation

During the early phase of NSF grant number HES 74-22657, Development of an Upper Division Electrical Power B.S. Engineering Technology Curriculum, it became apparent to the project staff that it would be extremely beneficial if a dissemination phase could be included. It was obvious that development of a Model Electrical Power Technology Curriculum would not be effective in alleviating the electrical manpower shortage if other institutions did not also start similar curricula.

A proposal was prepared and submitted to the National Science Foundation to fund a project to disseminate the model electrical power curriculum developed at Oklahoma State University under NSF grant, SED 74-22657. Also included in this project was an evaluation of the curriculum by appropriate representatives of the electrical power industry. The overall plan for this project was to have the original model curriculum, as implemented at Oklahoma State University, evaluated by both present and potential employers. The staff wanted the curriculum to be evaluated by a group of industrialists before it was disseminated to other institutions. These results and original curriculum were then to be disseminated to colleges and universities that might wish to implement an electrical power engineering technology curriculum.

Staff Activities

The project staff made visits to regional industries, conferences and other institutions to publicize the curriculum. Dr. Heiserman attended the American Society of Engineering Education Relations with Industry Conference in San Diego, January 1978. He presented a seminar on the electrical power curriculum and advertised the Dissemination

Conference that was to be held in August 1978. He also attended a workshop for technical educators in Boston, Massachusetts on Advances in Technology where he made a presentation on the OSU electrical power project. The workshop was sponsored by McGraw-Hill. Professor Shelton made a trip to Texas and visited with electrical power companies to discuss graduate employment possibilities. He made a presentation at Texas State Technical Institute that was attended by students, faculty and representatives from the electrical power industry.

Dr. McNeill attended the ASEE Summer Conference and discussed the curriculum with other engineering technology professors. All of the staff have been involved rather directly with publicizing the new curriculum with state and regional industries. These contacts have been maintained with both on-campus visits by industry representatives and by staff and student field trips to various companies.

Several articles have been published in local and regional newspapers about the project and the new curriculum. The Technical Education News printed an article by Professors Burson and Prejean concerning the development of the curriculum. A copy is included in the appendix. A notice of the curriculum project was also published in the Engineering Education News. The thrust of all this activity has been to make educational institutions and the electrical power industry aware that a new curriculum has been developed that can alleviate some of their technical manpower shortages.

Some educational institutions sent professors to the OSU campus for a personal evaluation of the curriculum and facilities. Professor Sterling from the University of Tennessee at Martinsville made a visit and has now started a similar program under an NSF grant. One professor from North Carolina came to visit the project at the insistance of his local power

company who had heard of the project and was interested in having a similar program in their state.

Dr. Neal Willison developed an audio-visual slide-tape presentation on the electrical power engineering technology curriculum. This presentation consists of approximately fifty slides and takes about fifteen minutes for a showing. It was developed to be used as a recruiting tool when professors are making visits to junior colleges. It is also useful in explaining the program to potential employers.

The major sections of the show are concerned with employment potential, curriculum, the laboratory orientation, industrial support and incentives for enrolling in such a program. The following list gives an overview of this slide show.

Electrical Power Technology Slide-Tape Show

OPENING - Title Slide

1. EPT
2. Career Decision - Academic Option

PREVIEW - 1. Job Opportunities - Job titles of past graduates
2. Starting Salaries - high and low
3. Equipment Orientation
4. School Requirements
5. Your choice - facts (based on)

NEW CURRICULUM - CAREER OPTION

1. History of EPT - developed at Oklahoma State University
2. Demanded & Supported by Industry - Industrial Advisory Picture
3. Needs of Today

MARKET

1. Job Opportunities - Titles of graduates
2. Industrial settings
3. Industrial demand

CURRICULUM

1. Overview - types of subject - /Tech & Related
2.
3.
4.
5. 1 slide for major course areas showing equipment and students at work.
6.
7. Stresses wide entry into the program, i.e. Associate Degree in Mechanical, Electronics, Drafting, etc.
8.
9.
10. Summary

BENEFITS

1. Academic Degree - advancement
2. Ability to be creative
3. Salaries
4. Variety of types of jobs
5. Location of work

TRAINING

1. Laboratory Setting - EPT Lab
2. Surveying Instruments
3. Equipment Orientation
4. Power Plant Tour

SUPPORT

1. Industrial Needs
2. Industrial Advisory Committee
3. Curriculum Materials developed

GOALS

1.
2. Job Profile
3. Take one student through job task.
4.
5.

JOB ORIENTATION

1.
2. Job quotation from employers - what is expected; G.E., Public Service, ...Co-op

INCENTIVES

1. Advantage of a 4 yr. B.S. Degree
2. Increased need for power/conservation
3. Vast future in Power Industry
4. Few EPT type curricula
5. High demand for EPT grads

APPEAL

1. Job Opportunities wide open
2. Hands on plus thinking ability
3. High starting salary - give OSU comparison

SUCCESS STORY

1. Your future
2. Your choice
3. EPT - one option

All of these publicity efforts have had very positive effects as the project has received numerous requests from industry, education and potential students. The requests have been for general information, curriculum sheets, course outlines, course syllabus and how to set up an advisory council. A list of who requested this information is in the appendix.

EVALUATION CONFERENCE

The evaluation conference was held on the Oklahoma State University campus May 1, 2 and 3. The participants in this conference were individuals who have all shown an extraordinary amount of enthusiasm and support for the EPT program. Included in this group of participants were three graduates from the program who were able to return from their jobs and share with the other conference members their industrial experiences. The conference participants and their industrial affiliations are listed below:

Thad Brown, PE, President
Industrial Electronics Testing Lab
PO Box 1596
Lake Jackson, TX 77566

Bill Burdett
Training Coordinator
Bell Operation Corp. of Dallas
1001 West Euless Boulevard
Euless, TX 76039

Doug Bursey, Engineer
People's Electric Corp., Inc.
PO Box 429
Ada, OK 47820

John R. Clayton, PE
Burns & McDonnell
PO Box 173
Kansas City, MO 64141

Charles Harvey, PE
Manager, Specialized Engineering
Public Service Company of Oklahoma
PO Box 201
Tulsa, OK 74102

Ethan Hassinger, PE
Southwestern Public Service Co.
PO Box 1261
Amarillo, TX 79170

Emmet King, Chief Engineer
Cotton Electric Cooperative
226 North Broadway
Walters, OK 73572

Randy Kriel, Electrical Power Graduate
Public Service Co. of Oklahoma
PO Box 201
Tulsa, OK 74102

Don Eggleston, Supt. - Maint.
Bell Operation Corp. of Dallas
1001 West Euless Boulevard
Euless, TX 76039

Kent Grebing, Electrical Power Graduate
1924 S. Utica
Tulsa, OK 74152

Carl Nash, Personnel Director
Nelson Electric Company
PO Box 726
Tulsa, OK 47101

Jess Reed,
Vice President
Empire District Electric Company
PO Box 127
Joplin, MO 64801

B.J. Stables,
Supervisor, Controls Group
Black and Veatch
PO Box 8405
Kansas City, MO 64114

Charles Sterling, Professor of
Engineering Technology
University of Tennessee at Martin
Martin, TN 38238

Wayne Loafman, Manager
Oklahoma Assn. of Elec. Coop.
PO Box 11047
Oklahoma City, OK 73111

Mike McDowell
Executive Director
Municipal Electric Systems of Okla.
201 NE 23rd
Oklahoma City, OK 73105

Kenneth Thomas, Owner
Electric Specialities
PO Box 15756
Tulsa, OK 74115

Curtis Trivitt, Chief Engr.
Electrical Power Graduate
Central Rural Elec. Coop.
Box 591
Stillwater, OK 74074

H.C. Walker,
Public Service Co. of Okla.
PO Box 201
Tulsa, OK 74102

William H. Wards, Chief
Division of Power Facilities
Southwestern Power Admn.
PO Drawer 1619
Tulsa, OK 74101

These individuals (with one exception) all came from the Electrical Power Industry. Early in the development of the EPT program the staff found it advantageous to break this entire industrial hiearchy into three different groups. These groups are (1) power generation and distribution companies, (2) engineering firms and (3) electrical equipment manufacturers. The reader will perceive that all three groups were represented at the May conference.

This conference was a compact two days of intensive activities as can be seen from the following agenda.

ELECTRICAL POWER ENGINEERING TECHNOLOGY

CURRICULUM EVALUATION CONFERENCE

Oklahoma State University

May 1,2,3, 1978

MONDAY - May 1, 1978

5-7 p.m.	Registration and Reception - Holiday Inn
7-9 p.m.	Dinner - Regency Room

TUESDAY - May 2, 1978

Progress Report 1974-77

8:30 a.m.	Welcome - Dr. K.A. McCollom, Dean, Division of Engineering, Technology and Architecture
	Engineering Technology at Oklahoma State University - Dr. James E. Bose, Director, School of Technology
	Development of the OSU EPET Curriculum - Dr. Perry R. McNeill, Head, Electrical/Nuclear Engineering Technology
9:15 a.m.	Review of the EPET Curriculum Structure - Dr. Russell L. Heiserman, Assistant Professor, Electrical/Nuclear Engineering Technology
9:45 a.m.	Coffee Break
10:00 a.m.	Course Content - Mr. James K. Shelton, Assistant Professor Electrical/Nuclear Engineering Technology
11:00 a.m.	Tour Laboratory Demonstration of Current Laboratory learning experiences - Electrical Power Seniors Tour of the Continuing Education Mobile Trailer
12:00	Lunch
1:15 p.m.	Student Characteristics and Graduate Job Placement - Mr. Jack Burson, Assistant Professor, Electrical Engineering Technology, McNeese State University, Formerly Oklahoma State University
3:15 p.m.	Coffee Break
3:30 p.m.	Industrial Advisory Sub-Groups in Review Session

4:30 p.m. Reconvene the Industrial Advisory Council

5:00 p.m. Break for the Day

WEDNESDAY - May 3, 1978

9:00 a.m. Sub-Groups' Recommendations

9:45 a.m. Coffee Break

10:00 a.m. Continue with Recommendations

12:00 Lunch

1:00 p.m. Reconvene and Wrap-up as necessary

In order to get the participants of this conference in tune with the materials to be evaluated and to determine what direction the conference discussion should take, a pre-conference questionnaire was mailed out to help achieve these two objectives. A copy of the questionnaire and the summary of the answers is included below.

PRECONFERENCE QUESTIONNAIRE
ELECTRICAL POWER CURRICULUM EVALUATION CONFERENCE

I. Purpose: The purpose of this questionnaire is to give the conference administrators the benefit of your early assessment of the Electrical Power curriculum in terms of your needs. This assessment will help us organize a more meaningful conference.

II. Instructions: Please read the enclosed material on the Electrical Power Curriculum: NSF FINAL REPORT, CAREER SHEET and OSU curriculum sheet. Answer the questions and return the questionnaire by April 10, 1978.

III. Questions:

A. What features of the Electrical Power curriculum, as presented in the accompanying written materials, prepare the graduate for responsible jobs within your company?

1. _____

_____

2. _____

_____

3. _____

_____

B. If you were to change the emphasis of the Electrical Power curriculum, as presented, what single change would you make to insure that graduates would be better prepared for employment with your company? _____

_____

_____

_____

C. After reviewing the written materials, what questions or areas of the curriculum do you feel should be discussed at greater length at the conference?

1. _____

_____

2. _____

_____

3. _____

_____

Thank you. Please return the questionnaire by April 10, 1978.

NAME_____ COMPANY_____

SUMMARY OF
PRECONFERENCE QUESTIONNAIRE
ELECTRICAL POWER CURRICULUM EVALUATION CONFERENCE

III. Questions:

A. What features of the Electrical Power curriculum, as presented in the accompanying written materials, prepare the graduate for responsible jobs within your company?

1. "Hands On" training with lab and test equipment.

2. Emphasis on controls.

3. All subjects except humanities and social science have direct application on work assigned. Varied technical.

4. Background is needed by student - he will move to various jobs in a company during his career requiring use of various areas of his schooling.

5. Good basic understanding of electricity.

6. Good circuit concepts.

7. The engineering technology program at the University of Tennessee at Martin is currently being revised to add more offerings in power. Thus, your program will be used as a model.

8. Curriculum appears to qualify one for position similar to that of our "Junior Engineer".

9. Computer techniques in electrical power systems (EPT 3233) is a valuable course.

10. Proficiency in written communications (GENAD 3113) is a requirement for long range growth.

11. The technologist can apply his Industrial Controls course (EPT 4134) in many types of electrical power industries.

12. Cross training to mechanical usage - Electricity is our tool for work.

13. "Hands On" features emphasizing use rather than intricate theory.

14. Understanding electrical "Language" - the symbols unique to our industry.

15. Electrical system distribution.

16. Electrical apparatus functions.

17. Techniques of supervising people.

18. Computer usage - Fortran programming.

19. Basic hydraulics and pnuematics for electrical power.

20. Industrial controls - lab "Hands On" experience with equipment.

21. Most "test companies are really medium and high voltage electrical equipment maintenance firms. The curriculum features that allow one to understand maintenance practices are most useful to us. A 3-hour course on field testing and test methods is needed by our technicians as well as our clients.

B. If you were to change the emphasis of the Electrical Power curriculum as presented, what single change would you make to insure that graduates would be better prepared for employment with your company?

1. Increased emphasis on solid state electronic devices in protective relaying, plant control systems, metering and communications.

2. More written and verbal communications. Substitute Engineering Economics for Humanities or Social Science. Although they are needed, these could be condensed or combined.

3. More stress on strengths of materials such as poles, cross arms and guy wires.

4. I would have reservations about being prepared for jobs within power generating stations.

5. Lab problems - emphasize the translation of verbal or written requirements into a working logic model.

6. Concentrated operating problems.

7. Possibly a second course in Industrial Controls (but it would be difficult to choose which course to sacrifice).

8. More emphasis on Nuclear Standards - understanding of IEEE and ANSI Nuclear standards.

9. I would include a 3-hour course on field testing and test methods.

C. After reviewing the written materials, what questions or areas of the curriculum do you feel should be discussed at greater length at the conference?

1. Battery, battery chargers, inverters and power supply applications.

2. Control systems - should include materials handling i.e. coal conveying.

3. Communications written and oral.

4. Lab equipment needs.

5. Salaries of EPT compared to BSEE.

6. How will new technology be incorporated in the program?

7. Assignment of duties, areas of responsibility.

8. Engineering programs applied to computer.

9. Where does the BSEPT graduate stand regarding eligibility to take the EIT examination?

10. Industrial controls lab.

11. Basic hydraulics and pneumatics for electrical power.

12. The need for a 4-year program vs. 2 years.

13. More input from industrial firms on their electric power technology personnel.

One of the more successful techniques developed in this conference was dividing the participants into small groups and requesting that they separately evaluate the curriculum. While there was some redundancy in their reports on the third day of the conference, there were also different aspects of the curriculum evaluated.

Reason for the Conference

The primary purpose for conducting a conference involving participants from industry during May of this year was to obtain information pertaining to industry's perception of the national model developed at OSU and to see how the present OSU EPT curriculum "stacks up" with this model. Since the program's inception the curriculum used at OSU has been subjected to a continuous and at times extensive re-write process. Part of this re-write has been due to industrial input but part has been done because of institutional influences.

A brief review of the approach to curriculum development used by the staff at OSU is probably in order. Initially, the OSU staff developed a trial EPT curriculum for review. The next step was to hold an industrial conference and have industry representatives thoroughly evaluate this original trial curriculum. The suggested changes (and these were extensive) were incorporated in the trial curriculum and this industry-modified

curriculum was then evaluated from an educational point of view by means of outstanding educators attending an EPT educational conference. Additional changes were incorporated in the curriculum. Then the course syllabus materials were written for each course in the curriculum and this material was in turn thoroughly evaluated by selected members from the two conferences (industrial and educational). The final product was termed the "model curriculum". This model is included in the appendix.

Next, this model curriculum was adopted by the Electrical Engineering Technology Department at OSU and classes were taught. The actual curriculum that OSU adopted was not the exact model curriculum but was one that was modified by "institutional requirements and constraints". This OSU adoption method was helpful in gaining an understanding of some of the problems that other institutions might encounter when implementing the model curriculum. The OSU adoption of the EPT model curriculum is also included in the appendix for comparison purposes with the model curriculum.

The second industrial conference that was held in May 1978, actually evaluated the OSU adoption. In many instances additional changes were suggested by the industrial representatives and these will be included in future curriculum modifications at OSU. Some of these suggested changes should be strongly considered by any institution that is implementing this program because they could be dealt with more efficiently at the beginning of a new program than at a later date.

Discussion and Recommendations Concerning the OSU Curriculum

In virtually any curriculum areas of relative strength and weakness can be identified. The industrial participants were asked to work in small groups and develop areas that they felt were especially important. They concentrated on both strength areas and problem areas. The graduates who attended this conference were especially helpful in providing input during these sessions.

For the most part, the industrial participants felt that the EPT program was (and is) fulfilling the original aims of providing competent graduates for the industry. Strong points were that the graduates from the program were able to become productive employees in industry in a very short period of time. The conference participants also felt that the model could easily be followed by any other institution that might choose to implement such a program. They felt that the selection of equipment in the laboratories was very good. The industrial participants noted that the background that the graduates received at OSU was not too specialized toward any one of the different groups discussed above but that it adequately prepared the graduate to enter any one of these three areas. Overall, the participants observed that the NSF grant has proven successful in providing a program that other institutions can follow.

The graduates present at this conference had some interesting insights regarding their preparing for their present jobs. One EPT graduate stated that he "just needed on-job training; he had learned the book material well". Another stated that he "feels capable of doing any job assigned to him; capable of advancing in his field; the foundation from OSU was very good". The third graduate noted that "he knows how and where to dig for information--his courses had prepared him for this". All agreed that the course work in the EPT program had successfully taught them the language and skills required to function effectively in their jobs.

The foregoing should not be construed to imply that the present program is perfect. The participants felt that some problem areas are still present in the program. One noteworthy topic that was discussed was that of safety. The overall feeling was that this topic should be more strongly stressed throughout all courses and especially in all laboratory experiments.

Another problem area was that of communications, both verbal and written. Most of this discussion centered around verbal communication and its importance in industry. The feeling of the advisors was that verbal communications for students could best be included in the program by means of incorporating it informally in lab presentations and similar circumstances instead of implementing formal speech courses in the curriculum. Outside of class speaking activities, such as Toastmasters, were strongly recommended.

A third general area that generated much concern among the conference participants was that of licensing EPT graduates as Professional Engineers. It became apparent during the discussions with the industrial representatives and the recent graduates that industry perceives the EPT graduate as an individual who should start working toward registration. Many of the jobs that the EPT graduates might fill in industry require that the employee hold a P.E. registration. However, licensing procedures are evolving toward the point where a person cannot become registered unless he has graduated from an engineering curriculum. This problem undoubtedly must be resolved somehow or the EPT graduates will not be allowed to work in positions for which they have been trained.

One of the industrial participants who is a registered P.E. stated the problem very eloquently when he addressed the conference concerning this problem. He said,

> "A personal message to every registered P.E. here. It is apparent our profession has made some hurried decisions regarding the recognition of these highly qualified and motivated graduates. Probably, this action can be blamed upon some hurried decisions made by a few states concerning 'control engineers', etc. I feel part of the problem lies in the fact that the profession does not know this new animal--hence has fears as to how it should be classified. I would like to charge us, all of us, with the responsibility of seeing that our local chapters fully understand

the training and motivation of the EPT graduate, and further, to see that our chapters erect no artificial barriers for any of them who desire to register into the profession".

Some of the discussion of problem areas in the curriculum dealt more with specific items. There was a strong recommendation to have engineering economics included in the program. All three graduates present at the conference felt that this area represented a definite void in their background. The consensus of opinion was that a formal engineering economics course should be implemented. There was also discussion regarding the mathematics level of the program. For controls to be taught more effectively, a more applied type of differential equations and Laplace Transforms was indicated as a need. This could probably best be done within the body of the EPT courses rather than adding more mathematical courses.

The cross training courses were discussed. There was a feeling that the "Mechanical Principles" course should continue to contain statics and strength of materials. Materials comparisons and trade-offs should be discussed. Also, some fluid mechanics and control should be added.

The microprocessor was a specific topic that the participants felt should be added. This should include teaching the micro itself as well as how they enter into existing systems. Application of these new devices was felt to be very important as it has been identified as an item that will be used extensively in this industry in the near future.

Open loop and closed loop control systems should be emphasized more heavily, especially in conjunction with the additional mathematics discussed above. This topic was felt to be a natural for utilizing applied mathematics.

A more in-depth study of various standards and codes was also identified as a needs area. The conference participants stated that more practice with

the electrical code, fire and safety codes and added study of nuclear/ radiation standards would be of value to the graduates. Also, more work with specialized laboratory measuring equipment was suggested, especially in the areas of instrumentation and fluidics.

A study of the above recommendations shows that there are not too many real voids in the present EPT curriculum at OSU. The major curriculum change would be the incorporation of an engineering economics course of some type into the present program. This should probably come early in the program (in the junior year) if possible. Most of the other suggestions could be interwoven into the existing courses with some effort and cooperation between the faculty members who are teaching the courses.

DISSEMINATION CONFERENCE

A conference to disseminate the results of developing the electrical power engineering technology curriculum was held on the Oklahoma State University campus August 1, 2, 3, 4, 1978. The participants in the conference were selected on the basis of geographical distribution and type of institution. A request for nominations of candidates was mailed out in March, 1978. Subsequently, invitations were sent to fifty nominees inviting them to participate in the dissemination conference. Eventually, thirty-three people accepted the invitation. The conference participants are listed below. It can be readily seen that a broad geographical distribution was represented from many different types of educational institutions.

CONFERENCE ATTENDEES

Victor K. Schutz
College of Engineering-Technology
Temple University
Broad Street & Columbia Ave.
Philadelphia, PA 19122

Charles Sterling
Engineering Technology
University of Tennessee at Martin
Martin, Tennessee 38238

Madan M. Bera
Dept. of Engineering Technology
School of Applied Science
Miami University
Oxford, OH 45056

Wesley G. Houser
Pennsylvania State University
The Capital Campus
Middletown, PA 17057

Charles P. Callis, Dean
Engineering Technology
University of Tennessee at Martin
Martin, Tennessee 38238

Sidney D. Jensen
Campus Mail #2401
3750 Harrison Blvd.
Weber State College
Ogden, UT 84408

Robert Cox
Wentworth Institute of Technology
550 Huntington Avenue
Boston, MA 02115

Dan Abbey
Engineering Technology
Florida International University
Miami, Florida 33199

John B. Carr, Jr.
Engineering Technology Dept.
Western Kentucky University
Bowling Green, Kentucky 42102

Victor A. Richley
Engineering Technology Dept.
Youngstown State University
Youngstown, OH 44555

George A. Solli, Head
Construction & Electrical Dept.
Room 326, Duckering Bldg.
University of Alaska
Fairbanks, AK 99701

William M. Copley
Bluefield State College
Bluefield, WV

R. Craig Hubele
Electrical Engineering
Michael Golden Labs
Purdue University
West Lafayette, IN 47907

George Chapman, Assoc. Professor
Electrical Engineering Technology
Saginaw Valley State College
2250 Pierce Road
University Center, Michigan 48710

Raymond L. Christensen, Assoc. Prof.
Dept. of Industrial Educ. & Technology
Northwestern State University of LA
Natchitoches, LA 71457

Thomas Grady
Arizona State University
TC 301-H
Division of Technology
Tempe, AZ 85281

Louis J. Galbiati, Dean of Eng. Tech.
SUNY, College of Technology
811 Count Street
Utica, NY

Juan R. Villar, Asst. Professor
Engineering Technology
School of Technology
Florida International University
Tamiami Trail
Miami, Florida 33199

E.T. Dickerson
University of Houston
Clear Lake Campus
2700 Bay Area Blvd.
PO Box 98
Houston, TX 77017

Burlin C. Cunningham
4800 Calhoun
Electrical-Electronics Tech. Dept.
University of Houston
Houston, TX 77004

Theodore Wildi
University of Laval
Electrical Engineering Dept.
Quebec, Canada GiK 7P4

Claude Seigler
College of Business
Industrial Technical Studies Dept.
Mankato State University
Mankato, Minnesota 56001

William D. Sheehan
University of New York State
Agricultural and Technical College
Alfred, NY 14802

John P. Gordon
College of Engineering & Technology
Northern Arizona University
Box 15600
Flagstaff, AZ 86011

Robert McCarty
Northern Montana College
Havre, Montana 59501

James D. Hendry
Old Dominion University
215 Kaufman Hall
Norfolk, VA 23508

Donald R. Hefty
Oregon Tech. Branch P.O.
Oregon Institute of Technology
Klamath Falls, OR 97601

R.J. Ungrodt
Milwaukee School of Engineering
1025 N. Milwaukee St.
Milwaukee, WS 53201

G.L. Rainey
Purdue University
Michael Golden Labs
School of Technology
West Lafayett, IN 47907

Martin J. Siebach
Rochester Institute of Technology
One Lomb Memorial Drive
Rochester, NY 14623

Gerald L. Pizer
Ryerson Polytechnical Institute
50 Gould Street
Toronto M5B 1E8
Toronto, Canada

Dale Warfield
2200 Bonforte
Electronics Engineering Technology
University of Southern Colorado
Pueblo, CO 81001

Melvin K. Anderson
Dept. of Technology
Southern Illinois Univ. at Carbondale
Carbondale, IL 62901

The conference was designed around a workshop mode in which the participants took an active part in the discussions. As each of the participants discussed the implementation of the curriculum at his home institution it gave others a chance to gain insights into different facets of the program. A copy of the agenda is listed on the following page.

ELECTRICAL POWER ENGINEERING TECHNOLOGY
CURRICULUM DISSEMINATION CONFERENCE
Oklahoma State University
August 1,2,3,4, 1978

TUESDAY - August 1, 1978 (Student Union Case Study C)

9:00 a.m.	Registration - Coffee & Donuts
10:00 a.m.	Welcome - Dr. Robert Swaim, Associate Dean, Division of Engineering, Technology and Architecture
10:15 a.m.	History & Overview of the Electrical Power Curriculum - Dr. Perry R. McNeill, Chairman, Electrical/Nuclear Engineering Technology Department and Dr. Russell L. Heiserman, Assistant Professor, Electrical/Nuclear Engineering Technology Department
12:00 Noon	Luncheon - Student Union Parlors D, E & F Mr. Czar Langston, General Manager, Oklahoma Association of Electric Cooperatives
1:30 p.m.	Curriculum Review - Mr. James K. Shelton, Assistant Professor, Electrical/Nuclear Engineering Technology Department
2:30 p.m.	Tour of the Electrical Power Laboratories and the Continuing Education Mobile Laboratory
3:30 p.m.	Cokes & Coffee - Industrial 113
3:45 p.m.	In depth Curriculum Discussion-Course Syllabus - Industrial 113
5:30 p.m.	Adjourn

WEDNESDAY - August 2, 1978 (Student Union Case Study C)

8:30 a.m.	Industrial Advisory Council Recommendations - Dr. Perry R. McNeill
9:15 a.m.	Comments by EPT Graduates, Kriel, Public Service Co., Teague, Gould Controls Division, Compston, Kansas Gas & Electric, Trivitt, Central Rural Electric Cooperative
10:00 a.m.	Coffee & Donuts
10:20 a.m.	Seminar of Industrial Representatives - Mr. Charles Harvey, Manager, Specialized Engineering, Public Service Company of Oklahoma, Mr. Kenneth Thomas, Owner, Electric Specialities

12:00 Noon	Luncheon - Student Union Parlors D, E & F
1:30 p.m.	Trends in the Electrical Power Industry - Dr. E. Robert Perry - Electric Power Research Institute, Palo Alto, California
2:30 p.m.	Coffee Break
2:45 p.m.	Graduate Characteristics - Mr. Jack Burson, Assistant Professor, McNeese State University
3:45 p.m.	Accrediting concerns with the EPT National Model - Mr. Richard Ungrodt, Vice President, Academic Affairs, Milwaukee School of Engineering
4:15 p.m.	Curriculum Panel Discussion - Mr. Shelton, Dr. McNeill, Dr. Heiserman and Mr. Burson
5:30 p.m.	Adjourn
7:00 p.m.	Dinner - Student Union Parlor A, B & C Alternate Energy Sources - Dr. Jack Allison, Professor, Electrical Engineering, Oklahoma State University

THURSDAY - August 3, 1978

7:30 a.m.	Depart for Tour of Tulsa Power Industry
9:00 a.m.	1. Public Service of Oklahoma (New Riverside Generating Station)
12:30 p.m.	Lunch - Heritage House
2:00 p.m.	2. Nelson Electric Company

FRIDAY - August 4, 1978 (Student Union Case Study C)

9:00 a.m. BUILDING YOUR ELECTRICAL POWER PROGRAM

Panel Discussion - Short presentations with discussion from the workshop participants

1. Recruiting Students - An Audio Visual Model, Dr. Heiserman
2. Developing and Constructing Equipment on Zero Dollars - Mr. Burson
3. Scholarships - Dr. Heiserman
4. Graduate Placement - Mr. Shelton

10:15 a.m.	Donuts & Coffee
10:45 a.m.	5. Developing & Using Advisory Council - Dr. McNeill
	6. The OSU Electrical Power Continuing Education Project - Mr. Robert J. Lager, Assistant Professor, Electrical/ Nuclear Technology
	7. Staff Recruitment - Dr. McNeill
12:00 noon	8. Workshop Evaluation
12:30 p.m.	9. Adjourn

As can be seen from the agenda the educators were able to hear from industry, as well as past graduates, how this program is accepted in the electrical power field. Mr. Langston's discussion of rate structure was a real highlight of the first day. A newspaper article describing his presentation is included in the appendix. The discussion by the Electrical Power graduates and the industrial representative was very well received by the audience.

Mr. Harvey and Mr. Thomas gave their impressions from the May Evaluation Conference and discussed how these graduates can be used in industry.

Mr. Perry's slide presentation on work being done at the Electrical Power Research Institute made an excellent point of what a dynamic industry the graduates of this program will be entering.

The accrediting session led by Professor Richard Ungrodt was informative. His consensus was that such curricula could be accredited by the Engineers Council for Professional Development. A copy of his paper is included in the appendix.

Professor Burson's discussion on student and graduate characteristics sparked a lot of interest among the educators. The salary schedule of graduates also held a great deal of interest for the professors. A copy of graduate employment salaries is included in the appendix.

The last item on the agenda was an evaluation of the conference by the participants. The summary shows a real satisfaction with the conference and the information disseminated. A copy is included in the appendix.

SUMMARY

The real proof of this project has been in the requests for assistance with electrical power engineering technology curricula. Many of the professors and administrators that attended the Dissemination Conference stated they were going to start either a similar curricula or at least make some power courses available to their electronics students. The acceptance of the curricula by American Industry is the ultimate proof that this is indeed a viable course of study for college students.

The faculty and staff are available within their given resources to help other institutions start an electrical power curriculum. This is indeed an exciting area of Higher Education.

APPENDIX A

SUPPORTING ELECTRICAL POWER ENGINEERING TECHNOLOGY WITH A TWO PLUS TWO CURRICULUM

ALL OF APPENDIX A, PAGES 26-30, REMOVED
DUE TO COPYRIGHT RESTRICTIONS

APPENDIX B

LIST OF INFORMATION REQUESTS

EPT INFORMATION REQUESTS
since July, 1977

STUDENTS

Jong Lee
6552-B Idlewild Rd.
Charlotte, N.C. 28212
(Central Piedont Community College)

Le Ditoa Van
1402 N.W. Ave. A
Andrews, TX 79714
(Odessa College)

Tran-Nam
Box e8g PJC.
Paris, TX 75460
(Paris Jr. College)

Everett Cayton
5154 SE 29 Apt. 161
Del City, OK 73115
(Oscar Rose Jr. College)

Burton Harms
8025 Golden Oak
Oklahoma City, OK 73127
(South Oklahoma City Jr. College)

Howell Flowers
2533 Kimberly Ave.
Bismarck, N.D. 58501

Kevin Ehart
Box 144 W.T.C.
Snyder, TX 79549
(Western Texas College)

Michael Carr
R.D. #2
Jamestown, PA 16134

Mike Bryan
5217 N.W. 46th Drive
Oklahoma City, OK 73122

Kent Self
Box 127
Snyder, TX 79549
(Western Texas College)

Ralph T. Martinez
10709 N. University
Oklahoma City, OK 73114
(O.S.U. Tech. Institute)

Pervez Khan
P.O. Box #1141
Al-Ain, Abu-Dhabi
United Arab Emirates

Lewis Crain
726½ East 14th
Ada, OK 74820

Nguyen Chanh Hai
911 North 15 St.
Fort Smith, Arkansas 72901
(West-Ark Comm. College)

Ms. Dorothy McLemore
Box 65
Haskell Indian Junior College
Lawrence, KS 66044

John Kirk
6327 Holbrook Dr.
Dayton, OH 45424

David Britton
Box 183 B
406 N Sandpiper
Ingleside, TX 78362
(Del Mar Tech.)

Khuc Dai Loi
2300 Lometa #202
Amarillo, TX 79109
(Amarillo College)

32

EPT INFORMATION REQUESTS

Industry

Mr. Arthur F. Drant III
Personnel Supervisor - Employee Relations
Square D Company
3700 Sixth Street, S.W.
Cedar Rapids, Iowa 52406

Jim Hulse
Missouri Power & Light
P.O. Box 603
Linn, MO 65051

33

EPT INFORMATION REQUESTS

Educators

John E. Emmons, City Chairperson
Industrial Arts Dept.
Canton City Schools
1120 15th Street, N.W.
Canton, OH 44703

Howard G. Miller, P.E.
Center for Degree Studies
Chairman, Electrical/Electronics Eng. Dept.
Scranton, PA 18515

Donald E. Wallis, Head
Dept. of Electricity/Electronics
Central Missouri State University
Warrensburg, MO 64093

Allen G. Frankley, Coordinator
Technology Division
Cerritos College
11110 East Alondra Boulevard
Norwalk, CA 90650

Mr. Douglas R. Norbeck
Instructor, Electrical Tech.
Duluth Area Vocational Tech. Institute
2101 Trinity Road
Duluth, Minnesota 55811

Dr. Anthony C. Renzi
Associate Professor
Dept. Of Electrical Technology
Erie Community College
North Campus
Main Street and Youngs Road, (Amherst)
Buffalo, NY 14221

Juan R. Villar
Assistant Professor
Engineering Technology
School of Technology
Florida International University
Tamiami Trail
Miami, Florida 33199

Paul E. Bennett
Assistant Professor
Electrical Engineering Tech.
Indiana State University Evansville
8600 University Boulevard
Evansville, Indiana 47712

William L. Olson
Lakeshore Technical Institute
Lakeshore Vocational, Technical, and
Adult Education District
1290 North Avenue
Cleveland, Wisconsin 53015

Joseph L. Cochran
Program Head
Electrical Technology
New River Community College
Drawer 1127
Dublin, VA 24084

William D. Sheehan, P.E.
New York, State University of
Agricultural and Technical College
Alfred, NY 14802

Stan Creitz
Department Chairman
Electricity-Electronics
North Central Kansas Area Vocational-
Technical School
P.O. Box 626
Beloit, KS 67420

Michael G. Michlein
Research Assistant
North Central Technical Institute
1000 Schofield Ave.
Wausau, Wisconsin 54401

Gene Menke
Master Instructor
Electromechanical Tech.
North Seattle Community College
9600 College Way North
Seattle, Washington 98103

Erwin C. Hamm, Prof.
Department of Industry & Technology
Northern Illinois University
DeKalb, Illinois 60115

Billy R. Reese
Northwest Iowa Technical College
Highway 18 West
Sheldon, Iowa 51201

Robert De Zeeuw
Electro-Occupations Dept., Chairman
Northwest Iowa Technical College
Highway 18 West
Sheldon, Iowa 51201

Deborah L. Swiencinski
Career Development and Placement
Pennsylvania State University (The)
The Shenango Valley Campus
147 Shenango Ave.
Sharon, PA 16146

Dr. J. Matthew Simon, Chairman
Dept. of Natural Sciences and Tech.
Point Park College
201 Wood Street
Pittsburgh, PA 15222

Prof. Edward Leff
Queensborough Community College
of the City University of New York
Bayside, NY 11364

David Hahn
Technology Dept.
Rio Hondo College
3600 Workman Mill Road
Whittier, CA 90608

Charles E. Irwin
Professor of Engineering
Technology Dept.
Rio Hondo College
2600 Workman Mill Road
Whittier, CA 90608

Anthony J. Curran, Director
Appliance Repair Dept.
Spokane Community College
N 1810 Green Street
Spokane, Washington 99207

David G. Easterly
Assistant Superintendent
State Area Vocational-Technical School
821 W. Louise Avenue
P.O. Box 130
Morristown, Tennessee 37814

Donald E. Whistler
Electrical Engineering
Technology Department
Trident Technical College
P.O. Box 10367
Charleston, S.C. 29411

J. R. Debenport
Electronics Instructor
Tyler Junior College
Power Coordinator
Tyler, TX 75701

Michael P. Lee
Utah Technical College at Provo
1395 North 150 East
Box 1009
Provo, Utah 84601

Susan Kirkpatrick
Curriculum Center
Wentworth Institute of Technology
550 Huntington Avenue
Boston, MASS. 02115

Dr. Warren L. Leffard
Faculty of Industrial Tech.
Center for Technical and Vocational Studies
Building 70, Room 103
West Florida, The University of
Pensacola, Florida 32504

L. H. Perkins, Director
Vocational Research and Services
West Florida, The University of
Pensacola, Florida 32504

Dr. Robert I. Eversoll
Assistant Professor
Dept. of Technology
Western Kentucky University
Bowling Green, Kentucky 42101

Richard Fowler, Prof.
Dept. of Technology
Western Washington University
Bellingham, Washington 98225

George A. Solli, Head
Construction & Electrical Dept.
Room 326, Duckering Bldg.
University of Alaska
Fairbanks, AK 99701

Dr. Madan M. Bera
Dept. of Engineering Tech.
School of Applied Science
Miami University
Oxford, Ohio 45056

Prof. Robert Merritt
Electrical Engineering Dept.
UNIV. of Alaska
Fairbanks, AK 99701

Donald Van Sciver
Curriculum Coordinator
Delcastle Technical High School
1417 Newport Road
Wilmington, Delaware 19804

T. Horbat, Professor
Department of Electrical Engineering Tech.
Hudson Valley Community College
Troy, NY 12180

S. J. Levanti
Assistant Professor
Department of Electrical Technology
Queesborough Community College
Bayside, NY 11364

Vernon Woolf
Associate Project Director
Technical Education Research Center--Southwest
4201 Lake Shore Drive, Suite 111
Waco, TX 76710

Dr. Davenport Plumer, Director
Office of Research & Evaluation
New York Institute of Technology
Wheatley Road, P.O. Box 170
Old Westbury, NY 11568

36

APPENDIX C

THE MODEL CURRICULUM IN ELECTRICAL POWER TECHNOLOGY

Model Curriculum

B.S. Engineering Technology Electrical Power

JUNIOR YEAR

1st Semester

			T	L	C
EPT	3XX3	Introduction to Electrical Power Systems	3	0	3
EPT	3XX3	Power Surveying and Drafting Practices	2	3	3
EPT	3XX3	Technical Report Writing	3	0	3
EPT	3XX3	Mathematics for Electrical Power	3	0	3
Cross-Training Courses:					
EPT	3XX5	Electricity for Electrical Power	4	3	5
EPT	3XX5	Mechanics for Electrical Power	4	3	5

NOTE: Typical loads for Electronics and Mechnical students would be 14 to 17 credit hours. Electromechanical students may need no cross-training and are free to take elective courses.

2nd Semester

			T	L	C
EPT	3XX4	Transformers and 3 Phase Circuits	3	3	4
EPT	3XX4	Electrical Machines and Control	3	3	4
EPT	3XX3	Computer Use	2	3	3
EPT	3XX3	Power Generation	3	0	3
Cross-Training Courses:					
EPT	3XX3	Basic Electronics for Electrical Power	2	3	3
EPT	3XX3	Basic Hydraulics and Pneumatics for Electrical Power	2	3	3

Note: Typical Load will be 17 credit hours.

SENIOR YEAR

1st Semester

			T	L	C
EPT	4XX3	Power Transmission and Distribution	3	0	3
EPT	4XX4	Switch Gear and Protective Relaying	3	3	4
EPT	4XX4	Industrial Controls	3	3	4
EPT	4XX3	Telemetry and Data Transmission	2	3	3
EPT	4XX3	Supervision and Safety	3	0	3
			14	9	17

2nd Semester

			T	L	C
EPT	4XX2	Special Problems	0	6	2
EPT	4XX4	Systems Planning	3	3	4
EPT	4XX4	Communication Systems and Circuits	3	3	4
EPT	4XX3	Nuclear Radiation and Safety	3	0	3
		General education to fulfill institutional requirements	4	0	4
			13	12	17

T: Theory hours per week
L: Laboratory hours per week
C: Semester credit hours

Course Descriptions

EPT 3XX3 INTRODUCTION TO ELECTRICAL POWER SYSTEMS. Prerequisite: junior standing. An introduction and overview of the electrical power industry. Selected topics to introduce the student to the various segments of the electrical power industry will be introduced.

EPT 3XX3 POWER SURVEYING AND DRAFTING. Lab 3. The course is designed to familiarize the student with surveying instruments and procedures unique to the electrical power industry. Electrical drafting using industrial symbols and terminology are included in the laboratory portion of the course. Electrical one line drawings and blueprint reading are also covered.

EPT 3XX5 ELECTRICITY FOR ELECTRICAL POWER. Lab 3. DC and AC circuit theory for the non-electrical students. This cross-training course will cover DC and AC topics such as Ohm's law, Kirchhoff's law, series and parallel circuits, magnetism, inductance and capacitance in direct current and time varying applications.

EPT 3XX5 MECHANICS FOR ELECTRICAL POWER. Lab 3. A cross-training course for non-mechanical students. The course and associated laboratory will cover gears, levers, drives, linkages, and other topics appropriate to the electrical power industry.

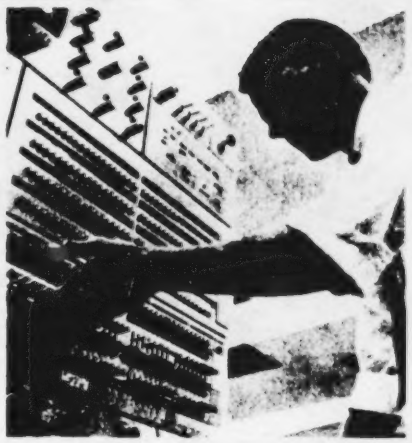
EPT 3XX3 MATHEMATICS FOR ELECTRICAL POWER. Integral and differential calculus topics as applied to electrical power application.

EPT 3XX4 TRANSFORMERS AND 3-PHASE CIRCUITS. Lab 3. Three phase power circuits. Topics covered are single phase and 3-Phase transformers and connections, 3-phase circuit theory, auto-transformers, and saturable reactors.

EPT 3XX4 ELECTRICAL MACHINES AND CONTROL. Lab 3. The study of the operation and control of both DC and AC machinery including laboratory tests of the control and on-line operation of such machines.

EPT 3XX3 COMPUTER USE. Lab 2. Computer usage to solve electrical power systems problems. An introduction to FORTRAN IV programming for problem solving.

EPT 3XX3 POWER GENERATION. The study of various methods of producing electrical energy. Topics covered will be steam and hydraulic turbines, steam boiler configurations, and alternators.



39

EPT 3XX3 BASIC ELECTRONICS FOR ELECTRICAL POWER. Lab 3. An introduction to electronic devices and circuits for non-electrical majors. Topics covered will be solid state device characteristics, power supplies, and introduction to amplifiers.

EPT 3XX3 BASIC HYDRAULICS AND PNEUMATICS FOR ELECTRICAL POWER. Lab 3. A study of fluid principals and components including pipes and tubes, valves, actuators, series and parallel fluid circuits, with applications to machine processes. For non-mechanical majors.

EPT 4XX3 POWER TRANSMISSION AND DISTRIBUTION. Topics covered include line sag, line loading, pole and tower configuration, clearance, line right of ways, for both transmission and distribution systems. Underground systems are also studied. Per unit quantities and symmetrical components are also covered. Long lines treated as transmission lines are covered.

EPT 4XX4 SWITCHGEAR AND PROTECTIVE RELAYING. Lab 3. A study of various types of switchgear and protective devices including relays, breakers, reclosers, sectionalizers, and fuses. An analytical study of the coordination of these devices is covered.

EPT 4XX4 INDUSTRIAL CONTROLS. Lab 3. A study of electric, pneumatic, and hydraulic industrial controls and control systems. Electronic components applicable to control systems are introduced and discussed in control circuit applications. Digital controls are covered.

EPT 4XX3 TELEMETRY AND DATA TRANSMISSION. Lab 3. A study of the various types of information and information gathering devices used in the electrical power industry. Systems studied included static wire, carrier current, phone pairs, and microwave.

EPT 4XX3 SUPERVISION AND SAFETY. An introduction to the principles of management and human relations. Safety standards and regulations, including O.S.H.A. will be covered.

EPT 4XX2 SPECIAL PROBLEM. Lab 6. Problems are assigned on either an individual or group basis. The problem will be designed to use the electrical power background of the students. A formal written report of the problem and solution will be required.

EPT 4XX4 SYSTEMS PLANNING. Lab 3. A study of the National Electric Code, estimating procedures and system economics will be covered. Environmental considerations will be included.

EPT 4XX4 COMMUNICATIONS SYSTEMS AND CIRCUITS. Lab 3. A study of data transmission and receiving systems circuits. Diagnostic procedures and measurement techniques will be included.

EPT 4XX3 NUCLEAR RADIATION AND SAFETY. A course designed to familiarize the student with different types of nuclear reactors and their characteristics. A study of nuclear devices used in industry and nuclear safety practices and procedures are included.

APPENDIX D

POWER PROGRAM SUPPORT RECOGNIZED NEWSPAPER ARTICLE

Power Program Support Recognized

Support by Czar D. Langston Jr., Oklahoma Association of Electric Cooperatives general manager, of the electrical power technology program at Oklahoma State University was recognized with presentation of a plaque early last month.

Langston received a plaque from Dr. James E. Bose, professor and director of OSU's School of Technology, during an electrical power conference held on the OSU campus the first week in August. Langston's presentation was made following his appearance as a luncheon speaker on the program.

The Oklahoma Association of Electric Cooperatives assisted the OSU School of Technology in obtaining a federal grant for use in training people to provide efficient electrical service to consumers and in holding down the cost of this service.

"We, the public-owned electrical utilities, appreciate the efforts OSU is making to obtain National Science Foundation help in developing an electrical power curriculum at the School of Technology," Langston said. "Our present and expanding manpower needs reveal that graduates of such a program are and will continue to be in great demand."

Langston continued by pointing out the electrical energy needs of the country demand highly competent technical manpower and that people are needed in Oklahoma "who can develop better generation and distribution of this resource in the most efficient manner possible."

Project director at OSU is P.R. McNeill, head of the School of Technology's Electronics Engineering Technology.

McNeill explained that graduates of the program "can contribute to the technological challenges of the nation's energy problems within two years after entering the program."

The main objective, McNeill continued, is to develop an upper-division Electrical Power Engineering Technology curriculum.

Expressing his belief that the OAEC will be in a position to help OSU and other schools nationally to both recruit students and to employ graduates of the program, Langston said he also feels the

"Thanks for your help," says Dr. James E. Bose, professor and director of Oklahoma State University's School of Technology, to Czar D. Langston Jr. Bose expressed his appreciation while recognizing the "continued support and interest in the School of Technology's electrical power technology program" during the past three years by Langston, general manager of the Oklahoma Association of Electric Cooperatives.

APPENDIX E

POTENTIAL ECPD ACCREDITATION BY RICHARD J. UNGRODT

43

POTENTIAL FOR ECPD ACCREDITATION

OF

ELECTRICAL POWER ENGINEERING TECHNOLOGY

Presented to
Curriculum Dissemination Conference
Oklahoma State University
August 1-4, 1978

By
Richard J. Ungrodt, P.E.
Vice President for Academic Affairs
Milwaukee School of Engineering

Introductory Comments

Regional Accreditation Versus Professional Accreditation
The Academic Institution

Faculty

Overall Competence
- -Level of Academic Knowledge
- -Relevant Industrial Experience
- -Enthusiasm for Teaching
- -Dedication to Engineering Technology
- -Activity in Professional/Technical Societies
- -Maintenance of Close Ties With Industry

Professional Activity
- -Should Be Members of and Active in Professional/ Technical Societies
- -History of Activity and Involvement in Professional/ Technical Societies
- -Should do Appropriate Research and Development
- -Should Have Background of Appropriate Industrial and Professional Experience to Relate Real Engineering/ Industrial Problems to Students for Class Work

Teaching Loads
- -Realistic and Fair Throughout the School
- -Adequate Time for Self-Development and Curriculum Development
- -Consider All Work Required of the Faculty
- -Sufficient Secretarial and Technical Support
- -Assumed Heavy Teaching Loads Are No Excuse for Lack of Participation in Professional Activities

Faculty (continued)

Number of Faculty Consistent with
- -Number of Students
- -Overall Duties

Minimum Accreditable Faculty (For Each Major Curriculum)
- -Two Competent Persons with Demonstrated Ability in Both Teaching and Engineering Practice
- -At Least One Should Have an Engineering Degree
- -Masters Degree is an Appropriate Terminal Degree
- -Key Lines in
  - What They Have Done
  - What They Are Doing
  - What They Plan To Do

Student-Faculty Ratio
- -Varies with Institutional Program
- -Varies with Teaching Format
- -A Judgement Factor for the Evaluator

Rank
- -Consistent with Other Comparable Areas of the Institution

Inbreeding
- -Undesirable Situation

Curriculum

Each School Sets Up a Program That Meets Its Objectives
Standardization of Programs is to be Avoided
Flexibility and Experimentation are Encouraged in Engineering Technology Curricula
Adequate Work in Technical Specialty to Provide Graduates with Education for Immediate Employment and Preparation to Meet Tomorrow's Challenges
Should Prepare Graduates with the Ability to Incorporate all the Essential Items in a Job Oriented Project
Must Meet or Exceed ECPD Requirements in Basic Science, Mathematics, and Humanities and Social Science
Should Meet the Department's Stated Objectives
Suggested Areas of Study are not Meant to be Limiting
Upper Division Courses Should Require a Greater Degree of Sophistication and Theory Than Lower Division Courses
Baccalaureate Programs Should Exhibit a Progression from Freshman Level Through Senior Level Courses

Facilities

Laboratories
- -Equipment Representative of Technical Specialty
- -Appropriately Instrumented
- -Sufficient Amount for Student Use - Hands On Experience
- -Supported by Proper Maintenance
- -Funded to Maintain Modern Equipment

Library
- -Sufficient Number and Variety of Reference Works for Projects, Research, and Professional Work
- -Complete Sets of Periodicals Pertinent to the Program
- -Utilization of Library Materials as Part of Student Assignments
- -Accessible to Students at Reasonable Times

Methods of Instruction
- -A Highly Individual Matter
- -Use Methods That Produce Best Results
- -Experimentation Should be Encouraged
- -Class Sizes
- -Computer - Instruction and Utilization

Students

Admissions - Recruiting
- -Recruiting Policies and Procedures
- -Records of High School Graduation or Equivalency
- -College Transcripts - AAS Or Equivalent
- -Provisional Admission - Probation
- -Appropriate Policies and Practices for Student Advising

Retention
- -Policies and Practices for Advancement
- -Policies and Practices for Probation and Termination

Quality and Level of Student Work
- -Examples (High - Average - Low) of Student Homework, Examinations and Laboratory Reports

Graduation
- -Graduation Requirements
- -Survey of Employers - Evaluation of Graduates

Summary

Students - Faculty - Curriculum - Facilities
- -No Prescribed List of Courses
- -No Prescribed Laboratory Facilities
- -No Prescribed Administrative Organization
- -No Absolute Minimum Faculty Qualifications
- -Each Curriculum Should be Judged on the Basis of the Job Being Done in the Preparation of Engineering Technologists

Any Institution That is Able to Contribute to the Development of Engineering Technology Education by Experiments and Departures from Common Practices Should Receive the Encouragement of the ECPD Engineering Technology Evaluator and the Evaluation Team. The Institution Should be Able to Justify any Major or Serious Deviation from the Stated Minimum ECPD Guidelines.

OSU - ECPD EVALUATION

	ECPD CRITERIA MINIMUM OF 120 SEMESTER CREDITS	ASSOCIATE TRANSFER REQUIREMENT	OSU UPPER DIVISION	OSU TOTAL
TH	3/4 YEAR	18	6	24
IENCE	22.5 SEMESTER CREDITS			
CHNICAL SCIENCES	1-1/2 YEAR	31	33	81
CHNICAL SPECIALITY	45 SEMESTER CREDITS		17	
SKILLS				
DESIGN				
ELECTIVES				
MMUNICATIONS				
MANITIES	3/4 YEAR	12	11	23
CIAL SCIENCES	22.5 SEMESTER CREDITS			
DESIGNATED	1 YEAR	--	--	--
	30 SEMESTER CREDITS			
TAL	4 YEARS	61	67	128
	120 SEMESTER CREDIT MINIMUM			

ECPD MINIMUM CRITERIA

Minimum Course Requirements

1. The program performance in producing baccalaureate graduates from programs meeting minimum course criteria and displayed employer satisfaction with these engineering technologists.

   A. The equivalent of three-fourths academic year of basic sciences and mathematics with the proportion of mathematics dependent upon the needs of the particular technological area.

   B. At least the equivalent of one and one-half academic years of technological courses, including technical science, technical specialty, and technical electives.

   C. At least the equivalent of three-fourths academic year in communications, humanities, and social science courses (not to include physical education or ROTC).

   D. The specifications listed above total three years of the four years required for a baccalaureate in a well-rounded engineering technology program. The additional time is available for the implementation of the educational objectives of the individual and the institution.

   E. A minimum of 120 semester hour credits for a baccalaureate.

   F. The total program should reflect adequate work and student progress throughout the four years to warrant the conferring of a baccalaureate.

Upper Division Programs

Upper division programs generally accept students from accredited associate degree programs. Students from non-accredited associate degree programs should have appropriate validation of their work. It is expected that those students with deficiencies in their background preparation for the upper division programs will be required to remove those deficiencies.

2. The faculty adequacy in numbers, competence, and the standards of instruction that it maintains in all subject areas that supply instruction to engineering technology students.

3. The admission of students, school policy on scholastic work, and the adequacy of operations for student advising, selective retention, and application of graduation requirements.

4. Administrative policy and effectiveness of leadership and the effects on teaching.

5. Financial and facility supports and availability as a measure of institutional dedication to the educational goals of engineering technology education.

SCHOOL OF TECHNOLOGY - STILLWATER CAMPUS

	A	B	C	D	E	F	G	H	I	J
	Degree	No. Grad.	No. Resp.	Grad. Sch.	Mil. Svc.	Marr. & Other	Seek. Empl.	Reporting Empl.	Reporting Sal.	Avg. Mo Salary
Aeronautical Technology	A **	9	1	*1	0	0	0	0	0	$ 0
	B **	14	12	0	4	0	3	5	4	1020
Construction Mgmt. Tech.	A	11	0	*0	0	0	0	0	0	$ 0
	B	20	20	1	0	0	1	18	18	1205
Electrical Power	B	10	9	1	0	0	1	7	5	$1236
Electronics Technology	A	28	13	*12	0	0	0	1	1	$ 750
	B	47	38	3	4	0	10	21	17	1177
Fire Protection & Safety Tech.	A	33	8	*5	3	0	2	1	1	$ 875
	B	16	16	0	0	0	1	15	15	1090
General Tech.	B	7	2	1	0	0	0	1	1	$1250
Mechanical Design Tech.	A	11	4	*3	0	0	0	1	1	$1267
	B	16	16	2	0	0	2	12	10	1173
Mechanical Power Tech.	A	3	1	*1	0	0	0	0	0	$ 0
	B	17	15	4	0	1	2	8	6	1212
Petroleum Technology	A	11	5	*2	0	0	1	2	2	$1060
	B	10	9	0	0	1	1	7	6	1389
Radiation & Nuclear Tech.	A	11	6	*3	0	0	1	2	2	$ 907
	B	11	5	1	0	0	3	1	1	1088
1977 TOTALS	A	117	38	*27	0	0	4	7		
	B	168	142	13	8	2	24	95		
Grand Totals		285	180	40	8	2	28	102		
Compared With										
1976 TOTALS	A	124	38	*23	1	1	6	7		
	B	169	146	18	5	0	30	93		
1975 TOTALS	A	134	50	*31	0	1	11	7		
	B	162	113	13	20	0	25	55		
1974 TOTALS	A	121	56	*29	2	0	7	18		
	B	168	138	6	15	0	36	81		
1973 TOTALS	A	134	46	*31	0	0	6	9		
	B	138	105	9	3	0	40	53		

**A = Associate Degree in _____Technology

**B = Bachelor of Science Degree

*or to continue work on Bachelors

JOB TITLES FOR EET & EPT
May 1977

MAJOR	DEGREE	
ELECTRONICS TECHNOLOGY	A	Engineer Technologist - Oil Company (1).
	B	Logging Engineer - Seismograph Service Company (1); Engineer/Scientist-Communications Manufacturing Company (3); Field Engineer Trainee-Wireline Service Company (1); Electronic Engineer-Engineering Company (1); Senior Engineer/Electronic Lab - Manufacturing Company (1); Engineering Scientific Asst. - U.S. Engineering & Physical Sciences Research Laboratory (2); Associate Geophysicist - Oil Company (2); Engineering Technician - Oil Company (1); Electronics Technician - Manufacturing Company (1); Self-employed - Sawmill (1); Chief Technician - Electronic Parts Manufacturing Firm (1); Asst. Engineer - Research Company (1); Technician - Engineering Consulting Firm (1).
ELECTRICAL POWER TECHNOLOGY	B	System Engineer - Electric Cooperative (1); Electrical Engineer - Electrical Company (1); Field Engineer - Electric Company (2); Electrical Design Engineer - Electric Company (1).

APPENDIX F

EPT GRADUATE EMPLOYMENT INFORMATION

52

MAY 1978 EPT GRADUATES

STUDENT NUMBER & LOCATION

1. Oklahoma — Accepted job with Electric Cooperative starting salary $15,750 per year plus car.

Job Offers

McGraw-Edison	$1340 per month plus car
Gould	**
Ralston Purina	**
GE	**

** Accepted job with Cotton Electric before they made a monetary offer.

Interviewed approximately 20 to 25 companies, Spring of 1978.

2. Kansas — Accepted job with a public utility starting salary $15,000 per year.

Total Interviews — 24 Spring Approximately 20 to 30 Fall

3. Kansas — Accepted job with a public utility starting salary $15,000 per year.

Job Offers

Electrical Manufacturer — $16,000 per year.

Interviewed 36 companies.

4. Colorado — Consulting Engineering firm $1150 per month.

Job Offers

Public Utility — $1250 per month

25 interviews total (30 minutes on campus)

5. Oklahoma — Accepted job with Electric Equipment Manufacturer as a Field Engineer in Installation and Service Department. Starting salary $1362 per month plus car.

Job Offers

Public Utility — $1350 per month

Interviewed approximately 15 companies.

6. California — Accepted job with a Space and Missles Co. starting salary $15,600 per year. Only job offer.

Interviewed approximately 15 companies.

7. Missouri	Accepted job with a public utility company starting salary $1250 per month.

Interviewed approximately 21 companies.

8. Florida	Accepted job with Electric Cooperative starting salary $15,500 per year.

Job Offers

Public Utility
Consulting Engineering Firm

Interview 30 companies.

APPENDIX G

CONFERENCE EVALUATION FORM AND SUMMARY

55

ELECTRICAL POWER TECHNOLOGY

CONFERENCE EVALUATION

Please take a few moments to evaluate the effectiveness of this curriculum evaluation conference. Indicate how we can make future conferences more effective.

____Yes
____No

1. Did notification of the conference give you adequate time to make arrangements to attend?

   Comment: _____

____Yes
____No

2. Were the pre-conference materials complete enough to indicate the objective and scope of the conference?

   Comment: _____

____Yes
____No

3. Were the physical facilities adequate for the conference?

   Comment: _____

____Too long
____Too short

4. Length of conference for what was to be accomplished?

   Comment: _____

____Yes
____No

5. Was the conference well organized to meet conference objectives?

   Comment: _____

____Yes
____No

6. Do you feel you had adequate opportunity to contribute to the conference?

   Comment: _____

____Yes
____No

7. Do you feel you gained what you expected to gain from the conference?

   Comment: _____

____Yes
____No

8. Do you feel that the information input at the conference was sufficient to guide you in developing a similar program.

   Comment: _____

____Yes
____No

9. Would you attend similar conferences in the future?

   Comment: _____

10. Please indicate your plans in using the material presented at this conference.

( ) A. Planning to add a similar program in the near future.

( ) B. Gathering information to see if such a program should be considered at our institution in the future.

( ) C. Material will be used to guide the revision of an existing program.

( ) D. Attended conference for general information only.

( ) E. Other use; please advise:_____

_____

_____

_____

Please comment on any aspect of the conference. Make suggestions that you feel could have improved the conference.

_____

_____

_____

_____

_____

_____

COMPILED DATA
ELECTRICAL POWER TECHNOLOGY
CONFERENCE EVALUATION

25 Yes
1 No

1. Did notification of the conference give you adequate time to make arrangements to attend?

Comments: Flight arrangements preceeded specific instructions; Very adequate.

23 Yes
2 No

2. Were the pre-conference materials complete enough to indicate the objective and scope of the conference?

Comments: To the point; Continuing Education Plant was a surprize; no itinerary until first meeting; could have stated objectives more fully; received material about one hour before catching plane--this was not the fault of OSU staff but mail service.

25 Yes
___ No

3. Were the physical facilities adequate for the conference?

Comments: Excellent; very good, excellent; lack of adequate dining facilities and their access was of concern; very good (3); very fine; outstanding.

5 Too Long
___ Too Short

4. Length of conference for what was to be accomplished:

Comments: Just right length (5); about right (5); appropriate (2); too long--checked only because it is the "more" appropriate for choices given; quite efficient--excellent guess as to requirements; probably could have been 2½ days with more infrequent discussion about complete matters sent before conference; too long--delete field trips unless exceptional; O.K. (2); might have been condensed by one day--field trip probably unnecessary; fine; excellent; quite adequate (2).

26 Yes
___ No

5. Was the conference well organized to meet conference objectives?

Comments: Planning execution & presentation were excellent; exceptionally; more attention is needed to readable view-graph visual aids; good; very well organized; I was quite pleased with it; just a great job; outstanding.

26 Yes
___ No

6. Do you feel you had adequate opportunity to contribute to the conference?

Comments: Suggest a looser schedule allowing interchange; circular nature of room good choice; very much so.

Continued...

26 Yes

____ No

7. Do you feel you gained what you expected to gain from the conference?

Comments: Learned more than expected; excellent for our situation; actually more--partially from interaction with other participants; good insight into EPT; excellent reference materials; more (4).

24 Yes

____ No

8. Do you feel that the information input at the conference was sufficient to guide you in developing a similar program?

Comments: Our situation is to develop Associate Degree in ET; not applicable since we have a similar program; since we are just starting an EET program this fall the information will influence our power option extensively; one half way on yes and no; best information on how grant was achieved and how project was completed; good source of industry publication; will help to improve already established program.

26 Yes

____ No

9. Would you attend similar conferences in the future?

Comments: Depends on what additional info is available; if it reports on experience gained in operating the program; if items of discussion were of interest and need; be glad to.

10. Please indicate your plans in using the material presented at this conference.

(3) A. Planning to add a similar program in the near future.

(16) B. Gathering information to see if such a program should be considered at out institution in the future.

(10) C. Material will be used to guide the revision of an existing program.

(1) D. Attended conference for general information only.

(4) E. Other use; please advise:

To guide in establishing an electric power field concentration in our program. The program proposal already developed would be compared with this OSU program to evaluate its effectiveness and thereby to modify.

Will try to add more to our power electives.
Consider as an alternative path in regular program.
Possibly add a new program.
Will develop power option with existing Elec. Tech. 4 year program.

Continued...

E. Cont.

To assist in organizing for and developing proposal and following through afterward.
Am involved in Technology programs in general.
Provide information to other schools.
Revise Assoc. Program to better prepare student to enter EPT program.
As indicated in "8". To use information, materials, techniques, etc. to help develop our Electrical Technology Associate Program--has never gotten off the ground to date.

Please comment on any aspect of the conference. Make suggestions that you feel could have improved the conference.

Would a "trading session," flea market (problem sharing), swap sheet, etc. be of any value to anyone else? My ideas came too late to ask.--This suggestion at beginning of course would be of advantage to us dummies. No or little official time needed can be achieved informally--evenings, etc.

Congratulations for an excellent conference. It would be helpful to follow up with a list of materials that are available for distribution.

The conference was an outstanding success. Well organized and yet in a pleasant, informal atmosphere.

Your work was informative, low key, experience based & well organized. In my case, best use can be made of what I learned of your proposal development, and follow through with program & materials development. My interest was in your "project" rather than in the technical details of EPT. WELL DONE!!

Maybe a little less food--I took on too many calories.

I appreciate the preliminary planning the staff and Dr. McNeill obviously put in to set up the conference. The result was most effective presentation. The only improvement I would have liked is very minor--some arrangement for getting the handout materials transported back (UPS perhaps) to save having to makeshift an arrangement for carrying on an airline.

Tour of Power Plant and Nelson was interesting but not necessary in my opinion.

Elect. Power Research Inst. presentation was outstanding. Overall, the conference was very well organized and operated. The men responsible are to be commended.

The friendliness and positive, helpful spirit of all OSU participating staff was the most important factor in making this program successful. Program was excellent--NSF should be extremely pleased--energy and enthusiasm and spirit of cooperation and apparent dedication of OSU staff was most important factor. Information shared and sources of further information was superior. I am most appreciating.

Some additional info on Co-op & its benefits to a program such as yours.

I feel the conference was outstanding in all respects.

Continued...

Program was good, well planned, I feel you should be complimented. Thanks.

Field trip not required.

Excellent planned program--very well coordinated.

Really appreciate all the handout material.

Well organized, executed and successful.

Very professionally done--enjoyed it and was impressed with those putting it on.

Was especially impressed with industry enthusiasm and support of program.

Program was very well organized! The information provided was almost too extensive, but will allow one to choose that material which might be of specific use. If such a program were to be introduced at Northern Arizona University, it would probably be integrated as an option in the existing four year program. I found that most of the participants were well chosen in terms of their interest and their contributions to the discussions. I feel that the conference was a success and you are to be congratulated both for the conference and your efforts in establishing this program.

Stipend checks should have been available at the end of the conference or at least notification prior to attendance as to where they would be distributed. The program and its presentation was excellent.

In general, I think the conference was very interesting and educational. Some of the presentations were too long. The field trip was too long and if shortened in time would have been more appealing. All in all, very good.

I think the faculty of EPT are to be congratulated for the overall effectiveness of the conference.

I was very well pleased with the entire program and feel that my time was well spent. The interest and enthusiasm of the presenters was very interesting. I am impressed with the materials made available and with the competency and dedication of the project participants. Thanks for an interesting and most informative conference.